Our front cover and the picture below both symbolize the 1949 series of discoveries of oil in Alberta. The derrick on the cover is at Golden Spike where the drills entered the thickest oil-bearing zone ever encountered in Canada. The winter scene below shows the separators at Joseph Lake.

Three years after Leduc

In this issue the Imperial Oil Review presents what is in effect one story—a survey of the great changes that have taken place in the Canadian oil industry, particularly in 1949. Economists view these changes as among the most important developments in the nation since the war and think that they will have a lasting effect upon Canada’s place in the world; also that they will help each of us to enjoy a higher standard of living.

Although Canada long has been a large consumer of petroleum products, until recently production of oil from within Canadian boundaries has been relatively small. But in the three years since the discovery of the Leduc oil field in Alberta, early in 1947, Canada has progressed rapidly toward maturity as an oil producing nation.

The year 1949 saw the extension of discoveries and their development to the point where Canada’s established oil reserves are believed to be sufficient to supply at least one-third of the country’s needs. Plans ripened to move western oil to eastern markets. The oil industry supplied greater quantities of petroleum and its products than ever before. These achievements, not of one company or one group of individuals, but of many companies and many individuals, are described in the following pages.

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PICTURE CREDITS

Front Cover, Inside Front Cover, pages 7 and 9, Harry Roved; Pages 3, 27 and 28, Matt and Merril; Pages 10, 11, 14, 18, 19, 21, 22, 24, 32, 33, and 36, Shell; Inside Back and Back Cover, 17, 21, and 27, Standard Oil, (N.J.); Page 23, Hayward Studios; Page 24, Turnstone Studios, Page 25, National Film Board; Pages 15 and 26, Gordon Jarrett; Page 13, Alberta Tourist and Travel Bureau.

MARCH-APRIL • 1950
Oil and Canadian Living

Petroleum, which provides 25% of the heat and power used by Canadians is basic to their high living standard.

Canadians and their neighbors across the border have more of the material comforts of life than any other people in the world. This is because mechanical energy has been harnessed to a high degree in Canada and the U.S., enabling us to make good use of the great natural resources of the continent.

Because the two countries have the machines to increase the efficiency of their manpower, they also have an increased production of necessities and comforts. The machine enables the average worker to produce more, to be paid more, and to buy more of the things he wants than would be possible in other lands where human muscle gets less help from mechanical energy.

The U.S. and Canada, with the world's highest standards of living, are necessarily the greatest per capita consumers of petroleum. Oil consumption is closely linked with our mechanization because petroleum provides approximately 35% of the heat and power used by Canadians.

Oil has become a keystone of modern living. It is the raw material for the manufacture of many drugs and plastics, of synthetic rubber and a host of other things. We need it to run our automobiles, our tractors, our aeroplanes, and to help operate our factories. Petroleum has taken its place among the power producers that increase Canada's productivity, adding to the average output per man hour which, in the final analysis, determines a country's standard of living.

PER CAPITA INCREASE IN CANADA

<table>
<thead>
<tr>
<th>Year</th>
<th>Per Capita Oil Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>1939</td>
<td>3.8 barrels</td>
</tr>
<tr>
<td>1939</td>
<td>4.4 barrels</td>
</tr>
<tr>
<td>1940</td>
<td>8.82 barrels</td>
</tr>
</tbody>
</table>

Imperial Oil Review  March-April • 1950
Canadians Are Using More Oil

In their rapid progress towards steadily higher living standards Canadians are using more and more petroleum every year. Since World War II the consumption figures have advanced higher and higher because of the country's industrial growth, the mechanization of its farms and the increasing use of fuel oil for domestic heating.

A difficulty for the Canadian oil industry was the fact that the postwar rise in demand began at a time when oil was in short supply in many parts of the world—a situation that lasted as late as the fall of 1948. There were many problems in supplying Canada's requirements. But vigorous exploration, the expansion of refinery capacities and the enlargement of storage and transportation facilities quickly began to show results.

Year by year the oil industry met Canada's needs as they rose to new peaks. In 1949 more than 116 million barrels of petroleum products were used, an increase of some 37 million barrels over 1946.

In addition to meeting the increased demand, the industry has introduced new products, improved existing ones and has attempted to provide steadily better service for customers.

The white bars on these pictures represent the sales trends from 1939 to 1949 for the products mentioned.

Aviation gasoline output has been increased in recent years to meet the needs of commercial airlines and R.C.A.F.

Residual, or heavy oil, has become increasingly important as a supplier of energy for ships and large industries

Other products, including lubricating oils, asphalt, liquefied petroleum gas, collectively have had mounting sales.
More Oil Is Available For Canadians

Now capable of producing one-third of her petroleum needs, Canada is looking toward self-sufficiency in oil.

**Canada's Oil Production Gains**

<table>
<thead>
<tr>
<th>1946</th>
<th>1949</th>
</tr>
</thead>
<tbody>
<tr>
<td>We used</td>
<td>We produced</td>
</tr>
<tr>
<td>78,045,975 bbls.</td>
<td>21,500,000 bbls.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimated</th>
</tr>
</thead>
</table>

**Canada's Oil Reserves**

- **1946**: 72,000,000 bbls.
- **1949**: 1,078,400,000 bbls.

*Western Canada figures based on estimate by A. J. Levermore, Dean of School of Mineral Sciences, Stanford University, California.*

In the past year, because of new discoveries and the extension of known fields, the estimated proven reserves in Alberta increased more than 100% to reach a total exceeding one billion barrels.

If discovery and development can be maintained at their present rate, self-sufficiency may be achieved in a few years.

This, however, would require the discovery of reserves three to four times the present size, indicating the vital role the "wildcatter" has to play.

Some idea of the rapid growth and development of the nation's oil reserves may be gained from the fact that before the discovery of the Leduc field in February, 1947—considered to be the turning point in the growth of our oil resources—proven reserves totalled some 72 million barrels. Canada's oil reserves have increased more than 15 times over what they were in the pre-Leduc days.

Aside from the tangible growth in reserves outlined above, the real achievement of the post-war years in Alberta has been in geological knowledge. The key to at least one of the major natural deposits of oil has been found in the coral reefs of the Devonian geological period. In that sense a great contest with reluctant nature has been won.

How great an advantage can be taken of this victory depends on human rather than natural factors. If still further additions are to be made to reserves, if the goal of self-sufficiency in oil is to be achieved and perhaps surpassed, other problems must be met. Broadly speaking, these problems concern adequate markets for western Canadian oil and continued encouragement for exploration and development so that capital for the highly risky business of oil-seeking will be forthcoming.

As outlined in the following pages, work is already in hand to widen the markets for western Canadian oil. This work, augmented by other programs which will become necessary if the fullest development is to be realized, will do much to aid future progress.

Oil Reserves Canada Needs for Self-sufficiency-3,000,000,000 bbls.
The Oil Discoveries Continue

The year 1949 will be recorded in Canada's oil history as another one of important discoveries. More than a hundred seismographs, gravimeters, and surface geological parties were engaged in the greatest search for oil in Canada's history. Hundreds of thousands of acres were surveyed and studied while drills probed continuously beneath the earth.

The Gulf Oil Company's discovery at Stettler was significant because of the location, indicating that producing reef structures may be found over a fairly large area of the central Alberta plains.

Imperial Oil, which was the pioneer of the present development with its discoveries at Leduc, Woodbend and Redwater in 1947 and 1948, last year added further to the list.

Two of Imperial's discoveries were of exceptional importance. At Golden Spike, not far from Edmonton, the drills entered the thickest oil-bearing zone ever encountered in Canada—545 feet (a recent well in this field established a thickness of 594 feet). This indicated that it probably will be the most productive new field discovered in the year. Although its extent is not yet known, it is believed reserves will eventually place Golden Spike with the major fields.

The Company's discovery well at Normandville, about 240 miles northwest of Edmonton near the Peace River, was the first evidence of commercial oil in that part of the province. Although present indications are that its extent and reserves will not be large, the find is important because it opens up a new horizon of geological significance.

Imperial Simmons No. 1, drilled near the big Redwater field was successful and added substantially to its potential.

Imperial's drilling crews also discovered oil at Bon Accord, Whitnauv, and Excelsior, while other discovery wells were brought in at Joseph Lake, Barrhead, Volmer and Campbell.

None of these latter discoveries added substantially to reserves. The year's activities underscored the fact that few large fields but many comparatively small discoveries may be expected as the search continues.
The Fields Are Growing

PARALLELING the remarkable growth of Alberta's oil reserves last year was the growth in potential production as a result of development drilling in the new fields.

Redwater, discovered in 1948, became Canada's largest potential producing field last year with the completion of 286 oil wells. The Leduc-Woodbend field (Leduc and Woodbend were separate discoveries but were later found to be one field) had a total of 362 producing wells by the year's end.

Although Redwater has less wells, the field surged ahead of Leduc-Woodbend in potential production because, with its greater reserves and thicker oil-producing strata, each well had an allowable production at year end of 325 barrels a day. Leduc, with two producing zones, had an allowable of 75 barrels a day for the D-2 and 115 barrels a day for the D-3, wells. Actually both fields are operating under prorating quotas, for Alberta cannot now market economically all the oil she can produce. At the end of 1949 the Redwater quota was 70 barrels per well per day, and at Leduc it was 55 barrels for D-2 and 80 barrels for D-3 wells.

During 1949 Alberta production averaged an estimated 54,000 barrels a day, but by year's end the potential production stood at 115,000 barrels a day.

"Christmas Trees" like that at the left are appearing in ever-increasing numbers in the west. A "Tree" is an arrangement of valves which control flow from a producing well.

GROWTH OF LEDUC AND REDWATER FIELDS
The Leduc field is now considered to include the Woodbend area.

<table>
<thead>
<tr>
<th>Field</th>
<th>Discovered</th>
<th>Oil Producing Wells Complted Each Year</th>
<th>Gross Production in Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leduc</td>
<td>February 13, 1947</td>
<td>27</td>
<td>372,427</td>
</tr>
<tr>
<td></td>
<td>1947</td>
<td>150</td>
<td>4,657,371</td>
</tr>
<tr>
<td></td>
<td>1948</td>
<td>185</td>
<td>9,781,597</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Field</th>
<th>Discovered</th>
<th>Oil Producing Wells Complted Each Year</th>
<th>Gross Production in Barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Redwater</td>
<td>August 31, 1948</td>
<td>2</td>
<td>36,874</td>
</tr>
<tr>
<td></td>
<td>1948</td>
<td>294</td>
<td>5,177,894</td>
</tr>
</tbody>
</table>


The Search For Oil Goes On

THE GREAT exploratory effort that intensified after the discovery of oil at Leduc three years ago reached a new high last year when some 203 exploratory wells were drilled in Alberta. This was more than double the number drilled in the previous year.

Of these 203 exploratory wells, 16 discovered oil. Four of these discoveries (three at Redwater and one at Leduc) extended the area of fields already found.

For the year, the odds against the driller finding oil in an exploratory well stood at almost 13 to one.

Of the 203 exploratory wells, Imperial drilled 38 and the remainder of the 203 were drilled by other companies. At the end of the year Imperial had seven rigs engaged in wildcat drilling while 31 rigs were being operated by other companies. There is every evidence that the effort will be maintained in 1950.

In the prairies more than 110 million acres of oil and gas rights have been taken up for exploration by more than 100 companies and syndicates. As a result, western Canada has become one of the most active oil exploration and development areas in the world.

Exploring in western Canada during 1949 were 110 geophysical parties, 11 of them operated by Imperial.
Oil Brings New Benefits

Canada's new oil fields, although producing under restrictions, have already brought important benefits to all Canadians and these will become even more widespread in the future.

To Canada as a whole western oil is saving $90 million annually in U.S. exchange. This saving helps all Canadians get more of the other imported goods they want. When the pipe line starts bringing Alberta's oil to eastern refineries, even more imported oil will be replaced by Canadian crude with further important exchange savings.

Supplies for the new fields, the new refineries and gathering systems have created new employment in Canadian industry. The Edmonton-Superior pipe line meant in 1949 more than $11 million in orders placed throughout Canada for steel, pipe, engines, boilers, communications, pipe line wrapping materials and the thousands of smaller items which will go into its building and operation.

One of the key changes which western oil has brought to Canada is the strengthening of the prairie economy so vital to the entire nation.

In the province of Alberta where the oil industry spent $22 million weekly in 1949, the benefits are most apparent. Population and employment have increased. New industries connected directly and indirectly with the industry have been established and others are projected.

For 1948 alone, Premier Manning reported the establishment in Alberta of 32 new industrial enterprises representing a total capital of $11 million and employing more than 1,200 people.

Construction of a new industrial building in Edmonton. Oil in Alberta has developed new industries and new employment.

Oil has become an important source of direct revenue for the province. In the first six months of the 1948 fiscal year the Alberta government collected more than $2.5 million from rentals, fees, purchases of leases and royalties. In the same period in 1949 the amount collected rose to more than $15.1 million. Alberta's over-all cash surplus for the first six months of 1949 was nearly $12 million, an amount eight times greater than that of the previous year.

From the Leduc discovery up to November 1949 the provincial government realized approximately $22 million through the sale of leases; about $5 million from royalties and approximately $6.2 million from fees and rentals.

In the year following the discovery of the Redwater field it is estimated that the sales of leases from this field alone netted the Alberta government $19 million. It is also estimated that over the next 25 years the province may reasonably expect to take in around $100 million from Redwater royalties alone.

But perhaps the most tangible benefit to Albertans and to the people of the prairie provinces generally has been the reduction in the prices of petroleum products. The new developments have meant lower product prices than would otherwise have been possible. Over the past two years the prairie consumer's bill for gasoline, tractor distillate and other fuels has been cut by about $9 million per year.

The impact of oil development in an area as richly endowed with human and natural resources as the Canadian west promises not only progress for that area but for the entire nation.

Alberta's government buildings. Revenues from oil helped the province to accumulate a surplus of $12 million in 1949.
The oil developments in the west quickened the economic pulse of all Canada, but the rapid growth of oil reserves also brought big and tough problems. The prime problem which Alberta's oil encountered in 1949 is not new to Canada. Like many another Canadian product, oil faces the need for low-cost transportation that will enable it to reach the markets where it can be used in large quantities.

Before the Leduc discovery in 1947 a different oil transportation problem existed. Then it was one of bringing oil to the prairies from distant United States fields. Increasingly large imports became necessary as Turner Valley's oil production declined, and tank cars had to go farther and farther afield to find the oil which prairie refineries needed. But once Leduc had been discovered, the situation changed rapidly. As production mounted from Leduc, Redwater and the other major discoveries, imports grew smaller and smaller and finally ceased in 1949.

The Alberta developments had made the prairies self-sufficient in oil, but it was soon apparent that the new fields not only could supply the prairies but also could provide oil for other parts of Canada. The new problem appeared: how to carry this growing oil production to markets outside the prairies?

As production outgrew prairie refining capacity special measures had to be taken. Until low-cost transportation is available, each well in Alberta has been prorated—permitted to produce only a fraction of its potential—and so every new well which comes in reduces the amount all the other wells can be allowed to produce.

Proratation has meant that Alberta wells are being held to the production which prairie refineries can handle—about 61,000 barrels a day. The wells could, at the end of 1949, produce about 115,000 barrels a day.

Finding a quick solution to the problem of adequate outlets for Alberta's oil is important to all Canada. In 1949 Canadian-produced oil saved the nation about $90 million U.S. dollars by backing out imports. When the pipe line is in initial operation that saving will be increased by $40 million.

And as the oil moves out to new markets, there will be a saving to the western consumer as prices come down. The reductions in product prices since Leduc are saving the prairie consumer about $8 millions a year and enlarged markets will not only mean further reductions for these consumers, but more customers will be brought within the range of the price benefits.

Wider markets should also mean an increase in the revenues which the Alberta government will receive from oil. It is true that, as prices come down, the revenue per barrel from royalties will drop in proportion, but because larger volumes of oil will be produced and marketed, the total revenue to the province should be greater. The extra income will strengthen such government projects as highways and education and should also strengthen the provincial economy generally.

Adding still further to the urgency of finding a wider outlet for western oil is the tremendous expenditure that has been made on development drilling in the west. Under the government regulations, the drilling of development wells is obligatory and must proceed whether or not the additional oil so developed can find its way to market. This has meant that in addition to the great expenditures on exploration, there has been a great deal of money invested in the development of fields that have already been discovered. The establishment of wider markets for this oil would throw out a good part of this partially-drawn investment, thus providing further capital for the future growth of the industry.

### Alberta Production vs Prairie Demand

<table>
<thead>
<tr>
<th>Category</th>
<th>Production (bbls. per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Production</td>
<td>Estimated as of December 31, 1949</td>
</tr>
<tr>
<td>Prairie Demand</td>
<td>Estimated Average, 1949</td>
</tr>
<tr>
<td>Actual Production</td>
<td>(Average, 1949)</td>
</tr>
</tbody>
</table>

**MARCH-APRIL • 1950**
The Pipe Line — One Way to Markets

Plans mature for an underground tube that will be a 1,150-mile link between the western oil fields and the Great Lakes.

A pipe line is the cheapest means of moving large quantities of oil over land distances. The need for a new Canadian pipe line became urgent as the Alberta oil fields developed to the point where they would be able to supply the requirements of the prairies and also provide crude for other areas of Canada. The line would help keep petroleum flowing to refining centres both in and outside the prairies at comparatively low cost and widen the markets.

Construction of a major pipe line, however, is an enormous undertaking involving long range planning, complex economic considerations, the investment of large amounts of capital, and the organization of men, materials and equipment on a large scale. Imperial Oil was ready with the plans. The Company first began to consider construction of a pipe line not long after the Leduc discovery in the belief that Leduc was only the first major oil find on the plains and that others would follow. Events have proved this belief to be sound.

The planners felt the line should run from Alberta to the Great Lakes, where tankers could complete the delivery of oil to eastern refineries.

An eastern route for the pipe line was an obvious choice. The pipe line planners reasoned it this way: to the west lay the formidable barrier of the Rocky Mountains and a relatively small market outlet for crude to refineries in British Columbia. To the east, the country was not only flat and easy to traverse, but the line would take oil to the areas where its value would be highest and where the largest market exists.

Early in 1949, the Interprovincial Pipe Line Co., sponsored by Imperial, was formed to build the line. Imperial's intention, however, was not to enter the pipe line business as such and it has a minority interest in Interprovincial.

Originally it was planned to lay pipe between Edmonton and Regina as a "first step" towards the lakehead. Mounting oil reserves, however, made the need for a lakehead outlet even more pressing and now Interprovincial is working towards completion of the entire 1,150-mile Edmonton-Superior line by the end of this year with enough of the six pumping stations in operation to deliver oil to Superior. The line will be in full initial operation early next spring.
As soon as the weather permits, heavy equipment will go into action on the prairies. Giant ditching machines will carve a trench across the flat lands, welding crews will join the pipe into a continuous tube, the pipe will be coated and wrapped and finally buried in the trench ready to carry an underground stream of oil.

Initial capacity of the Edmonton-Regina section will be 85,000 barrels a day, dropping to 70,000 barrels a day from Regina to Superior. Provision has been made, however, to add six additional pumping stations at about 100-mile intervals. These additional stations could increase the line's capacity to 130,000 barrels a day at Edmonton, when conditions warrant an intake of that volume.

The Edmonton-Regina link will have 20-inch diameter pipe; the 340-mile Regina-Great Falls, Man., section will be 16-inch and the 360-mile line between Great Falls and Superior will be 18-inch.

The complete line will require 175,000 tons of steel pipe. Canadian mills are making the 18-inch size, but since they cannot make any larger diameter, the 18 and 20-inch pipe will come from the United States. Deliveries of the 20 and 16-inch sizes both began in January, the larger size coming from Milwaukee, Wis., and the 16-inch from a new pipe mill built at Welland, Ont.

The pipe line system does not solve the transportation problem—tankers will be needed to carry the oil from the Superior terminus to Ontario refineries.

To add to the existing fleet, plans were drawn up for the construction of two new ships—the largest tankers ever to be built in Canadian shipyards and the largest ever to sail the Great Lakes. They will be built at Collingwood and Port Arthur and will be ready for service in the spring of 1951. Pipe Line Tankers Ltd., a newly organized company, is building the ships and Imperial will charter them for 15 years.

Oil men believe Canada is witnessing the beginning of a new era in oil development and the transportation problems which accompany it. Other pipe lines will probably be needed to carry Alberta's mounting production to market and so increase the extent of its benefits.
A Pipe Line Evolves

**Government Approval**
The Dominion Board of Transport Commissioners approved the project after close examination.

**Company Organized**
The Interprovincial Pipe Line Co., a new Canadian company, was organized to build the line.

**Analysis**
Exports studying the oil transportation problem decided that a pipe line should be constructed.

**Financing**
The $90 million required to build the line was raised by selling bonds, debentures and stock.

**Preliminary Problems**
Preliminary steps included surveying the route, and obtaining right-of-way, steel and equipment.

**Construction**
Actual pipe laying will begin this spring and should be completed before the end of the year.

**Operation**
The line will be in full initial operation early in 1951. Some oil will flow through it this year.

---

Here the Alberta is being launched. The new tanker is 628 feet long, 81 feet in breadth and 421 feet in depth. Her deadweight tonnage is 26,900, cargo capacity, 228,000 barrels.

**Other Carriers Work Overtime**

**Tankers** on the oceans and Great Lakes, railway tank cars in many parts of the country, existing pipe lines, trucks and other transportation agencies have been performing a very difficult task in carrying the oil Canada needs.

The past year saw an important addition to the Imperial Oil Shipping Company’s fleet—the 26,500-ton Imperial Alberta, Canada’s largest tanker. She was built at the Sun Shipbuilding and Dry Dock Co. yards at Chester, Pa., and launched in April, 1949.

Her service has been between South America and the Middle East and ports in eastern Canada and the United States. The big “supertanker” has a capacity of 228,000 barrels or nearly eight million gallons. Her cost was about $51 million.

The ocean fleet saw the retirement of three of its veterans. The 23-year-old Imperial Regina (ex-Regina) was sold for scrap. The Imperial Victoria (ex-Ontariola) also came under the scraper’s hammer and the third vessel to be retired was the Imperial Whitby (ex-Foremost), which was the oldest tanker in Imperial’s service. She was built at Dundee in 1912.

In 1949 two tankers continued to serve Canada with refined products and in period of peak demand Imperial used 5,730 of them, either owned or leased. In the west, however, the cars carrying crude oil were on new runs. Instead of rolling deep into the U.S. to bring crude to such refineries as Regina, they were moving oil from the quickly developing fields of Alberta to prairie refineries.

With the growth of Alberta’s new oil fields, railway tank cars have been kept busy carrying crude to refineries on the prairies. At a peak in 1949 Imperial used 5,730 cars.
From the refineries

Products For Canadians

Although Canadians have been among the world's leading consumers of petroleum throughout the century, their needs have become steadily more urgent in the past decade. To keep pace with these needs has meant expansion of refineries. The 44.8 million-barrel throughput in 1939 had grown to 60 million barrels by 1945. Since 1945 there has been a further jump to 97.5 million barrels. And in spite of this 118½% increase in 10 flush years, still more refining capacity is on the way.

Imperial's part in meeting 1949 needs for oil products amounted to 148,000 barrels a day which was the average throughput of the Company's eight refineries. Throughput in 1948 was an all-time record of 155,000 barrels a day. A decade ago Imperial's seven refineries (Edmonton refinery was not even a dream at that time) had an average daily throughput of about 71,000 barrels.

Most important 1949 increase in refinery capacity was at Edmonton, which was raised from 6,000 to 16,000 barrels a day by adding equipment.

This fractionating column of "bubble tower" is at Sarnia, Imperial's largest refinery. Crude oil, heated to 750°F., is pumped into the tower for separation into oil products.

Regina refinery capacity was restored following a fire and explosion last April, which damaged the crude still battery. A bauxite treating unit, formerly used to remove ill-smelling impurities from Turner Valley crude, was remodelled into a pipe still of 16,000 barrel a day capacity. Crude oil from the Leduc and Redwater fields does not need the bauxite treating equipment.

At Montreal East, Canada's first "cat cracker" completed its first full year of operation. The refinery added a new laboratory. Changes were made so that near East crude can be run and the required octane rating obtained.

New developments in wax production got under way at Sarnia during 1949, when work was started on wax de-oiling and on wax re-crystallization units. Wax usually contains about 15 per cent oil, and the de-oiler will extract this to about three per cent. This means that the wax purifiers will be able to do a better and quicker job and so increase wax output by about 10 million pounds a year.

The re-crystallization unit is designed to make micro-crystalline wax, never before produced in Canada. These have high melting points and are used for such things as drinking cups and wax paper. In these products it is important to have a wax which will bend rather than crack. The new unit will be a 5,000-pound semi-commercial experimental plant.

Sarnia refinery will be the first major refinery in Ontario to be changed over from 25 to 60-cycle electricity. The change will be made in 1950. New transformers are now being installed and other preparations made for the change-over.

Work is progressing on a new 800-barrel per day liquefied petroleum gas plant, which will turn out bottled gas. It is expected to be in operation next July, bringing the convenience of gas to homes and industries beyond reach of gas mains.

These highlights of refinery progress in the past few years do not by any means encompass all the changes that have taken place as the refineries adapted themselves to rapidly changing conditions. New facilities have been set up for employees, new processes introduced for customers in all parts of Canada.
More Oil—More Uses

To motorists, more perhaps than to any other single group in Canada, has come the opportunity to test the success of the oil industry's efforts to provide more and better products and service.

In each postwar year increasing numbers of cars and trucks have appeared on the highways. Not only did they require additional supplies of gasoline, but as the engines improved, they required a better grade of gasoline. And as motorists began travelling farther afield after wartime restrictions were removed, the nation-wide system of retail outlets was gradually extended and improved.

Since the war, gasoline has continued to be the largest selling petroleum product in Canada. In Canada, demand for motor gasoline rose from some 33 million barrels in 1946 to nearly 46 million barrels in 1949.

In addition to meeting the demand, the industry has kept abreast of car requirements and, through research, has improved the quality of both premium and regular grades of gasoline. Recent improvements in refining technique, notably catalytic cracking, have made it possible for the refiner to increase the gasoline yield from a barrel of crude and at the same time to improve product quality and octane ratings.

The improved power that motorists enjoy in the new 1950 cars is possible because of high-compression engines and gasolines that have about twice the octane rating of the fuels in use in 1924.

Along with this rise in quantity and quality has come an improvement in the facilities for service. Close to 1,000 new retail outlets were established throughout the country in 1949, bringing the industry's total number of stations to an estimated 31,050—an increase of nearly 4,200 over 1946. During 1949, nearly 250 new Imperial Oil retail outlets were established and today the motorist can buy Imperial products in every province of Canada, and in the Northwest Territories.

Of key importance to the motorist are the dealers who operate most of Canada's service stations. Imperial's dealers, all of whom are independent business men, have the benefit of advice from the Company which is made available as part of an organized program.

There has been a marked trend in recent years towards greater service station efficiency through the use of faster delivery pumps and special lubricating apparatus.

Behind the service station, the marketing organization has similarly stepped up its efficiency. There has been a significant increase in truck capacity. In 1946, the average capacity of a truck was 879 gallons. Today's typical truck carries approximately 1,421 gallons—an increase of 61 per cent. in three years. Special fast loading racks have been established at many bulk terminals to speed the turn around of trucks between the retail outlet and the bulk plant.

Another improvement which has brought considerable benefit to the dealer and his customer is the credit card system. Customers find it convenient, particularly when travelling any distance. At the same time, the dealer is relieved of the problem of extending credit on his own account.

More Products for THE FARMER

Life is more comfortable and more productive for the farmer today than it was a generation ago—largely because of farm mechanization.

The trend towards greater farm mechanization which received such an impetus following World War II, continued through 1949. Today, there are more than three times as many tractors, five times as many combines and three times as many trucks on Canadian farms as there were before the war.

Making sure that the farmer is supplied at all times with the fuels and lubricants he needs for his new machinery is one of the chief responsibilities of the oil industry. Sometimes the problems of delivery are very difficult, particularly in western Canada where the distance between farms is often great.

In recent years, Imperial Oil has taken steps to ease the farm supply problem by promoting the installation of farm storage tanks. To date, some 17,000 of these storage tanks, with an average capacity of 150 gallons, have been installed in the three prairie provinces. The movement was pioneered in western Canada but is growing in Ontario and Quebec.

The transition from a steel barrel economy to a tankage economy has brought advantages to both farmer and distributor. More efficient and more economical, tankage also ensures better service since it reduces the likelihood of the farmer running short of fuel. At the same time, tankage enables the farm agent to make larger, more economical deliveries—an important factor in a time of rising costs.

Besides helping to keep the farmer supplied with petroleum products, Imperial provides special services for agriculture. Farm meetings and tractor clinics have been introduced to acquaint farmers with the most efficient uses of machinery and of petroleum products, thereby helping them to operate economically and obtain better returns for their work.

At these farm meetings motion pictures are shown, talks by competent agricultural technicians are heard and helpful hints are given on how to lengthen the life of farm equipment. General topics include such matters as soil and moisture conservation. After the formal talks the farmers can discuss their individual problems with one of Imperial's farm service engineers.

Last year, 120 farm service meetings were held in the prairies and the program has recently been extended to include eastern Canada.

Tractor clinics are designed to give the farmer more detailed and technical information and are at present held in the western provinces.
More Oil — More Uses

... More Products for THE HOME OWNER

One of the most important factors contributing to the ease and comfort of Canadian living is the increasing use of oil for home heating.

The big demand for heating oil came after the war but because of the general shortage of refining capacity and transportation equipment, the industry was not able to meet the demand immediately. When the supply situation improved and with the gradual phasing out of steam for building storage tanks and other facilities, the industry made an intensified effort to meet domestic oil requirements. In recent months, it has been able to look after the backlog of orders and has been taking on more and more new accounts.

Within two years, there has been an 11.9% increase in the use of oil for heating purposes. According to the Canadian Consumer’s survey, 11.7% of Canadian homes were heated by oil in 1947 while the 1949 figure was 23.9%.

The increased use of oil as fuel has brought big changes in the industry. At one time domestic heating oil and other products in the “middle distillate” group, were secondary products to gasoline. Now they are moving up toward equal status. Although gasoline consumption is up, the distillate fuels, particularly domestic fuel oils, have been the large factor in carrying the industry to a new level of operations.

In Canada last year, the sale of middle distillates showed a 261% increase over 1940. This trend has complicated the industry’s supply problems because of seasonal fluctuations in demand. Unlike most petroleum products where the demand is relatively constant throughout the year, domestic oils have peak and slack seasons.

During the winter months when fuel oil requirements are highest, the industry must continue to take care of its other commitments. This creates many problems because only a comparatively fixed proportion of each petroleum product can be obtained from a barrel of crude oil without making major changes in the refinery. (The average yield from a barrel of Imperial’s crude in 1949 was approximately 40.3% gasoline, 23.9% distillate fuels, 20.5% heavy fuels and gas, 7.6% other products and 7.7% consumed in operations.)

Ability to meet changing conditions is one sign of a progressive industry—and the oil industry is taking the postwar evolution in its stride. Greater storage facilities will make it possible to build up supplies of fuel oil during slack seasons. And as advances in petroleum technology continue to be made, the refiner may find a solution to the problem of adjusting output to meet seasonal demand.

Still in limited supply, propane gas for cooking, heating and other uses is one of the oil industry’s many developments.

... More Products for INDUSTRY

A major reason for the maintenance of Canada’s high standard of living have been the country’s industrial expansion during and since World War II. In the 10-year period from 1957 to 1947, industrial production almost tripled. In 1947, the gross value of industrial production was approximately $10 billion where it was $3.3 billion in 1939.

This rapid growth in the nation’s industrial structure has been accompanied by a similar increase in the industrial uses of oil which are as numerous and varied as industry itself. These uses are not confined to any one petroleum product but embrace the whole range of petroleum fractions from the heavy bunker fuels to the liquefied petroleum gases.

Bunker fuels have found a growing market with railway and marine companies and with certain types of industry. For example, more and more steel mills are using oil to fire their open-hearth.

Canadian railroads have increased the number of oil-burning locomotives by over 160 during the past year. C.P.R. locomotives on the Calgary-Vancouver run have been converted almost entirely to oil-burning as have the C.N.R. trains from Edmonton to Vancouver. Additional conversions, which will be made next year, will extend oil-burning locomotives eastward.

With ships, the trend is increasingly toward the use of bunker and diesel fuels. In 1958, 45% of the ocean-going ships calling at Canadian ports were using heavy fuel or diesel. By the end of 1948, the number of ships using either heavy fuel or diesel had increased to 32% (31% heavy fuel and 21% diesel). Of the ships now being built, an estimated two-thirds will be motor-driven (diesel).

Delivery of industrial oil products is a big job for the oil companies. Imperial Oil uses modern trucks like this one.

The growing popularity of the diesel engine also is apparent in the transportation industries and in the construction, lumbering and mining industries where diesel-powered units are increasing yearly.

The light fuels, too, are finding new uses. With the development of new and improved jet aircraft there is a growing demand for aviation kerosene.

The possibilities of liquefied petroleum gases are just beginning to be realized. In Canada, liquefied petroleum gas is largely confined to domestic heating and cooking but it is also used to heat chicken hatcheries and in new automobile engines during factory run-ins.

In addition to developing new uses for petroleum, the industry is continuing to improve and enlarge the scope of existing products. This is particularly evident with greases and lubricants which are made to meet specific industrial requirements. For example, research has developed products for the steel rolling mills and paper mills which require special lubricants. Two recent developments in products to meet extreme weather conditions are the low-temperature automotive crank case oils such as were used in operation Snowscooter, and the high-temperature water-resistant greases.

All these highly specialized uses for industrial fuels have placed a heavy responsibility on marketing representatives. Many companies employ trained sales engineers whose duty it is to check the correct application of a specified product to a particular use or industry. This work will be even more important in the years to come as more and varied petroleum products are needed to take care of the country’s industrial requirements.

MARCH-APRIL • 1950
Huge Investments Are Being Made

Jobs and payrolls multiply as the oil industry invests $2 millions weekly in Alberta, puts scores of millions into new transport and refineries

In building for Canada’s future, huge investments are being made to find and develop the new oil fields of the west and to provide new manufacturing equipment and new services in many parts of the country.

Last year Canadian and U.S. risk capital totalling more than $100 million was invested in western Canada on the oil and gas developments and on the closely related program of pipe line and refinery expansion. That was more than double the 1948 spending; five or six times the amount spent in 1947; and at least seven times the investment in any of the years before the Leduc discovery.

Approximately $2 million was spent each week in the west last year by the oil industry as jobs and payrolls multiplied and a great new oil supply system began to take form.

In addition to the investments in the west, the industry has spent other large amounts elsewhere in Canada in the past three years. Equipment and supplies came from many parts of the country. New ships have been built, new or improved refining units have been placed in operation, marketing facilities have been added.

Research

— Develops new products, new processes
— Maintains quality

Twenty-five years ago the oil industry made a comparatively small number of products; today it manufactures a long list of petroleum specialties. This development is due in no small measure to patient and ever-continuing research which has created new processes and new or improved products.

Imperial was a pioneer in Canada in establishing a petroleum research laboratory which is at Sarnia and which celebrated its 25th anniversary last year. Between 40 and 50% of the world’s lubricating oils come from plants using the phenol treating process developed in Sarnia. Other achievements of the Sarnia laboratory include early work on the vacuum process of distilling lubricating oils; special research on greases, waxes and asphalt; and the development of the napthogen catalytic cracking process.

Imperial also operates product control laboratories at all its refineries to ensure that high standards of quality are being maintained.
Costs are Up

During 1949, currency devaluation, freight rate increases and other factors tended to raise the price of many petroleum products. But as the year drew to a close, long-term comparisons showed that petroleum products, in spite of sharp rises in crude oil and other costs, were still cheap in comparison with other goods and with the purchasing power of Canadians.

Gasoline prices, for example, were up 52% in representative markets from 1939 (excluding the higher provincial gasoline taxes). This compared with a rise of 108% in average wholesale prices during the same period and a rise of some 93% in the average wages and salaries of Canadian workers.

Translation of gasoline prices into terms of the average weekly pay of a Canadian showed that again excluding the provincial tax) the average worker could buy 154 gallons for a week's pay at the end of 1949, compared with 118 gallons for a 1939 week's pay.

Aside from the effects of devaluation on the price of crude oil, which brought an international commodity, related directly to currency changes, there were no important changes in the cost of crude oil at Canadian refineries. Consequently, there was little cause for concern about changes in product prices, other than those needed to bring various products into a more appropriate balance.

In the prairies however, more fundamental changes were taking place. The gradual displacement, by gasohol refined products, of fuels brought in from refineries in Ontario and elsewhere tended to spur price reductions and to curb any increases that became necessary. A good example of this occurred in the first month of the new year, when prices in northern Saskatchewan came down in the face of higher freight rates. The drop reflected the fact that this area was now being supplied from the Imperial refinery at Edmonton, with a resulting economy for the consumer.

**COMPARISON—Wholesale price of standard grade gasoline vs. road tax**

Prices at principal cities, at year end.

**COMPARISON OF GASOLINE WHOLESALE PRICE INDEX (Without Federal and Provincial Gasoline Taxes) WITH GENERAL WHOLESALE PRICE INDEX**

[Graph showing comparison with data points for different years.]
Oil People Tackle
The Big Job

More workers, a greater variety of skilled and urgent jobs feature Canada’s oil transition

The task of supplying Canadians with oil and its products involves the services of some 50,000 people. All these are directly engaged in some phase of the Canadian oil industry. About half this number are independent retail dealers operating their own businesses.

The other 25,000 men and women of oil have a great many different occupations. Some look for crude oil and others operate the fields after oil has been discovered. Still others work in the refineries where the crude is turned into hundreds of useful oil products. The industry also employs many people in moving oil from one place to another. This involves driving trucks, operating pipeline lines, sailing tankers on oceans and inland waters.

The oil industry has four main divisions—exploration and production, manufacturing, transportation and marketing. Within these four fields and the associated staff departments there are a great variety of jobs employing salesmen, chemists, engineers, truck drivers, stenographers, physicians and nurses, lawyers, accountants, clerical workers. In fact almost every trade and profession is represented.

In short, the industry requires the employment of many skills and the employees are carefully selected. They must be intelligent, reliable and often must have highly specialized knowledge. As a result oil people are paid good wages and salaries.

In turn, these men and women of oil through their loyalty and co-operation are helping the industry to meet a record demand for petroleum products and to build for the future. By helping to keep oil flowing, they are playing an important part in maintaining high Canadian living standards.

Health counselling, under the direction of a staff of physicians and nurses of Imperial’s medical department, is an important feature of the Company’s expanded medical program.

About Imperial People

Over the years Imperial employee and management have co-operated to maintain good wages, good working conditions and security. These aims are the primary concern of the Company’s department of employee relations and of the system of joint councils through which employees have full democratic representation. Imperial has been a pioneer in the Canadian oil industry in introducing employee benefit programs and in 1949 a number of the plans were reviewed and liberalized.

Some facts about Imperial employees and about changes in the employee benefit plans are described briefly below:

Increased Employment

The number of Imperial Oil employees has almost doubled in 10 years—from 6,917 in 1939 to 12,601 in 1949. The development of the Company’s interests in the west has added substantially to employment.

Annuities and Pensions

In 1949, 105 employees were retired on pension, bringing the total number of annuitants to 1,028 as at Dec. 31, 1949.

Last year, because of increased living costs, a supplemental payment was granted to aid pensioners in receipt of pension income of less than $100 a month.

JOINT COUNCILS

As at Dec. 31, 1949, there were 85 joint councils. Of these, 11 were in the Canadian affiliates of Imperial Oil, eight in the manufacturing department, 45 in the marketing division, two in the producing department, 14 in the marine department, one in the pipeline division and one in building administration.

The first joint council was organized in December, 1938. Every year those employees represented by joint councils elect their delegates by secret ballot. The Company appoints an equal number of delegates and the combined body becomes the joint council. All aspects of hours of work, wages, and working conditions are matters for determination by the Council.

At 800 refinery this wage earners are represented by local No. 414 Oil Workers International Union.

BENEFIT PLANS

Imperial Oil has a security program for employees which includes the Annuity Plan and the Thrift Plan; Death Benefits; Group Life Insurance; Accident and Illness Benefits; and Hospitalization and Surgical Benefits. The program provides an income on retirement; protection for dependents; if the em-
Kenneth A. Henderson, C.B.E., treasurer and vice-president of Imperial Oil, died suddenly on December 31. During the past three years he had helped to direct the financial planning for the Company's growing activities in many parts of Canada. He was 45 years of age.

Mr. Henderson joined Imperial in November, 1946, following outstanding service as securities advisor to the Bank of Canada. During World War II he was executive chairman of the National War Finance Committee and he played a major role in the success of the campaign that raised funds to win the war. He also served as advisor to the Foreign Exchange Control Board. He was awarded the C.B.E. in recognition of his wartime services.

Born in Acton, Ontario, he graduated from McGill University in 1925 and joined the firm of Wool, Gandy & Company as a junior in Toronto. He was transferred to Montreal and later became a partner in the investment firm of Cullers, North and Henderson. He joined the Bank of Canada as securities advisor in 1935.

About Imperial People (Continued)

Employees become permanently disabled or die; and assistance in cases of injury or illness of the employee or a member of his family. The plans are constantly being reviewed and when necessary are revised to meet changing conditions.

Hospitalization and Surgical Benefits Changes

The hospitalization plan, introduced in 1944, was amended last year to give increased protection to the employee and his family. Where hospitalization payments formerly were paid for periods up to 40 days, they now are paid for up to 70-day periods. In recognition of rising costs, hospitalization benefits were increased from $4 to $6 per day; maximum surgical benefits went up from $150 to $200 and maximum coverage for special hospitalization services was raised from $40 to $90.

Annuity Changes

Revisions made in 1949 in the Annuity Plan provide an additional credit for an employee upon his retirement. The credit is based on his earnings in his first year with the Company when he was ineligible to participate in the Company’s Thrift and Annuity Plan. (After the first 12-month period of employment he may voluntarily subscribe to the Plan setting aside a percentage of his salary to which is added contributions by the Company.) This additional credit is paid for entirely by the Company and supplements the regular annuity payments.

The minimum period of service for normal retirement from the Company was reduced last year from 20 to 15 years. A deferred annuity from the pension fund can now be granted to any employee leaving the Company with 15 years of service, even though he does not qualify for normal retirement.

Training Courses

An orientation course was introduced in 1949 and by the end of the year 120 leaders were trained to tell employees about Company operations.

The supervisory training course, introduced on a Company-wide basis in 1948, was continued through 1949. Some 600 supervisors have completed the course.

Personalities in the News

Alfred E. Morson Appointed Manager General Traffic Department

Alfred E. Morson recently was appointed manager of Imperial’s general traffic department, succeeding the late W. E. Kleinstein, who died on Oct. 27, 1949. Mr. Morson joined Imperial in 1917 as a shipping clerk at the Princess Street plant in Toronto. The following year he enlisted in the Royal Air Force and on his discharge he returned to Imperial to work in the marketing stock department. Later he moved to the Toronto traffic department, transferring to the general traffic department in 1928. He was appointed assistant general traffic manager in April, 1948.

Ian Lute Succeeds A. E. Morson

Ian H. Lute has been named assistant manager of the general traffic department, succeeding A. E. Morson. Born in Aberdeen, Scotland, Mr. Lute came to Canada at an early age. He joined Imperial Oil in 1929 as an office boy. After working in several positions with increasing responsibility he became chairman of the Company’s tank car committee, which was formed to study the economics of tank car transport. In 1946 he was appointed co-ordinator of the traffic department and two years later was temporarily transferred to the manufacturing department as assistant to the operations manager. On his return to the traffic department in 1949 he was named traffic assistant.

David Quinn Receives 40-Year Service Button

David Quinn of Sarnia refinery recently completed 40 years with the Company and received his service button. Born in Sarnia Township, Mr. Quinn joined Imperial at Sarnia in 1909. At first he worked in the yard labour department and later transferred to the candle works. For a number of years he has been employed in the sewing room where many canvas articles used in the refinery are fabricated. Mr. Quinn is an ardent baseball fan and manages a community baseball team.

Isaac Dawson Completes 40 Years’ Service

Isaac Dawson formerly co-ordinator, marketing accounting, at Toronto, recently retired after serving 40 years with the Company. Mr. Dawson was born in Belfast, Ireland and joined the Company’s Winnipeg office in 1910. He has served in the accounting departments at Winnipeg, Regina, Calgary and Toronto. In 1944 he was made assistant manager of the accounting department at Toronto. Two years later he was appointed assistant co-ordinator, marketing accounting, becoming co-ordinator the following year. Before retirement he was presented with his 40-year service button.

March-April • 1950
Looking Ahead

An indication of what to expect in the future from Canada’s oil industry came recently in a statement by Hon. N. E. Tanner, Alberta’s minister of lands and mines. Mr. Tanner said that expenditures on the oil developments in Alberta this year “are expected to reach $150 million.”

The investment of huge sums like this means that the search for new Canadian oil reserves will be continued in full vigor. The large amounts of money do not, in themselves, guarantee success. Many dry holes—the investment of many millions of dollars—preceded the Leduc discovery. And, as the new phase of search proceeds, there are sure to be additional failures and disappointments.

But the money that is being poured into Canada’s oil future does mean that the petroleum industry is now assuming a key place in the Canadian economy. It means that geologists are confident new fields will be discovered in Canada and that every effort will be made to locate them.

Meanwhile the existing fields are being developed. Work is pressing ahead on the construction of Canada’s first major pipe line and by the end of this year western oil will begin to flow eastward.

Imperial will continue to play a leading part in these activities. The Company’s program of exploration will proceed both in the west and in southwestern Ontario. Already this year it has been announced that work is beginning on Imperial’s new refinery which will be built in Winnipeg to serve the Manitoba area and help to complete the domestic prairie oil supply.

It seems certain that Canada’s oil requirements will continue to mount during 1960. Estimates are that the country’s oil consumption this year will surpass the 1949 all-time peak. With a growing population, an increased industrialization, and further mechanization Canadians will need still greater quantities of oil.

This fact re-emphasizes the importance of the western developments. This is why Imperial and other companies are continuing their expansion programs both on the prairies and elsewhere in Canada. This is why new ships and new refineries are being built, and other new facilities are being provided.

The immediate future will be a period of continued intense activity by the Canadian oil industry and one in which the direct benefits of western oil will be extended to more and more Canadians, helping still further to improve the nation’s standard of living.
In shipyards at Collingwood and Port Arthur, work like this will be in progress this year building the largest tankers ever constructed in Canada. The new ships will go into service on the Great Lakes.